e+ e⁻ annihilation cross section, $\sigma = (20.8\ \mathrm{nb.GeV^2}/4s) \int \int (1+\cos^2\theta^*)d(\cos\theta^*)d\phi$,

where,

s = (center of mass energy)^2 = $W^2 = 4(E_b^*)^2 = (2m_\mu)^2$ at threshold

W = total energy in the system

E_b^* = center of mass beam energy

θ^* = center of mass polar angle => 0 to π

ϕ = azimuthal angle => 0 to 2π

In lab: $W = \sqrt{2E_{beam}m_e}$, so at threshold, $E_{beam} = (2m_\mu)^2/ 2m_e = 43.7$ GeV

Integrating over ϕ,

$$\sigma = \underbrace{(2\pi\ 20.8\ \mathrm{nb.GeV^2} /16(E_b^*)^2}_{8.168/(E_b^*)^2\ \mathrm{nb}} \int \underbrace{(1+\cos^2\theta^*)d(\cos\theta^*)}_{2\frac{2}{3}}$$

At E_{beam} = 43.7 GeV ,

$E_b^* = m_\mu = 0.1056$ GeV, $\sigma_{tot} = 1.9\times10^{-30}\ \mathrm{cm^2}$